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☐ 1. Document ID: US 20040215640 A1

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L6: Entry 1 of 5

File: PGPB

Oct 28, 2004

PGPUB-DOCUMENT-NUMBER: 20040215640

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20040215640 A1

TITLE: Parallel recovery by non-failed nodes

PUBLICATION-DATE: October 28, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
Bamford, Roger J.	Peterborough	NH	US
Chandrasekaran, Sashikanth	Chennai	CA	IN
Pruscino, Angelo	Los Altos		US

US-CL-CURRENT: 707/100

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	ISMC	Draw Desc	Image
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☐ 2. Document ID: US 20030225760 A1

L6: Entry 2 of 5

File: PGPB

Dec 4, 2003

PGPUB-DOCUMENT-NUMBER: 20030225760

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20030225760 A1

TITLE: Method and system for processing replicated transactions parallel in secondary server

PUBLICATION-DATE: December 4, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
Ruuth, Jarmo	Espoo		FI
Parkkinen, Jarmo	Helsinki		FI
Soini, Petri	Vantaa		FI
Wolski, Antoni	Kirkkonummi		FI

US-CL-CURRENT: 707/5

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC	Draw Desc	Image
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☐ 3. Document ID: US 20020099729 A1

L6: Entry 3 of 5

File: PGPB

Jul 25, 2002

PGPUB-DOCUMENT-NUMBER: 20020099729

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20020099729 A1

TITLE: Managing checkpoint queues in a multiple node system

PUBLICATION-DATE: July 25, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
Chandrasekaran, Sashikanth	Bellmont	CA	US
Bamford, Roger J.	Woodside	CA	US
Bridge, William H.	Alameda	CA	US
Brower, David	Alamo	CA	US
MacNaughton, Neil	Los Gatos	CA	US
Chan, Wilson Wai Shun	San Mateo	CA	US
Srihari, Vinay	San Francisco	CA	US

US-CL-CURRENT: 707/203

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC	Draw Desc	Image
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☐ 4. Document ID: US 6978396 B2

L6: Entry 4 of 5

File: USPT

Dec 20, 2005

US-PAT-NO: 6978396

DOCUMENT-IDENTIFIER: US 6978396 B2

TITLE: Method and system for processing replicated transactions parallel in secondary server

DATE-ISSUED: December 20, 2005

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ruuth; Jarmo	Espoo			FI
Parkkinen; Jarmo	Helsinki			FI
Soini; Petri	Vantaa			FI
Wolski; Antoni	Kirkkonummi			FI

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
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Solid Information Technology Oy

Helsinki

FI

03

APPL-NO: 10/156799 [PALM]

DATE FILED: May 30, 2002

INT-CL-ISSUED: [07] G06 F 11/00

US-CL-ISSUED: 714/6; 714/16, 707/202

US-CL-CURRENT: 714/6; 707/202, 714/16

FIELD-OF-CLASSIFICATION-SEARCH: 714/6, 714/16, 707/202, 707/8

See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>5452445</u>	September 1995	Hallmark et al.	707/2
<u>5781910</u>	July 1998	Gostanian et al.	707/201
<u>5799322</u>	August 1998	Mosher, Jr.	707/202
<u>5806075</u>	September 1998	Jain et al.	707/201
<u>5870761</u>	February 1999	Demers et al.	707/201
<u>6065018</u>	May 2000	Beier et al.	707/202
<u>6122630</u>	September 2000	Strickler et al.	707/8
<u>6144941</u>	November 2000	Hotti et al.	705/4
<u>6324654</u>	November 2001	Wahl et al.	714/6
<u>6725242</u>	April 2004	Gardner	707/203
<u>2002/0087501</u>	July 2002	Breitbart et al.	707/1
<u>2002/0116457</u>	August 2002	Eshleman et al.	709/203
<u>2002/0133507</u>	September 2002	Holenstein et al.	707/200
<u>2003/0217119</u>	November 2003	Raman et al.	709/219

ART-UNIT: 2114

PRIMARY-EXAMINER: Baderman; Scott

ASSISTANT-EXAMINER: Contino; Paul

ATTY-AGENT-FIRM: Young & Thompson

ABSTRACT:

This invention relates generally to database servers and computer systems and, more particularly, describes the mechanism to run transaction operations originating from a primary server used to replicate data in parallel in a secondary server. Especially the invention relates to running concurrent or parallel operations in a secondary server for redundancy, recovery and propagated transactions. This invention describes how parallel operation in a secondary server improves performance and availability and how it maintains transaction order and output congruent with the primary server where transaction operations are originated.

30 Claims, 16 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMC	Draw Desc	Image
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☐ 5. Document ID: US 6078930 A

L6: Entry 5 of 5

File: USPT

Jun 20, 2000

US-PAT-NO: 6078930

DOCUMENT-IDENTIFIER: US 6078930 A

TITLE: Multi-node fault-tolerant timestamp generation

DATE-ISSUED: June 20, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lee; J. William	Foster City	CA		
Bridge, Jr.; William H.	Alameda	CA		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Oracle Corporation	Redwood Shores	CA			02

APPL-NO: 08/961798 [PALM]

DATE FILED: October 31, 1997

PARENT-CASE:

This application is a continuation of and claims priority from patent application Ser. No. 08/808,582, filed Feb. 28, 1997, entitled Fault-Tolerant Timestamp Generation for Multi-Node Parallel Databases which is incorporated herein by reference.

INT-CL-ISSUED: [07] G06 F 17/00, G06 F 11/00

US-CL-ISSUED: 707/202; 707/203, 714/20

US-CL-CURRENT: 707/202; 707/203, 714/20

FIELD-OF-CLASSIFICATION-SEARCH: 707/200, 707/201, 707/202, 707/203, 714/12, 714/15, 714/16, 714/20

See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4507751</u>	March 1985	Gawlick et al.	364/900
<u>5001730</u>	March 1991	Franaszek et al.	375/107
<u>5155678</u>	October 1992	Fukumoto et al.	395/425
<u>5278982</u>	January 1994	Daniels et al.	395/600

<u>5280611</u>	January 1994	Mohan et al.	395/600
<u>5561795</u>	October 1996	Sarkar	395/600
<u>5566180</u>	October 1996	Eidson et al.	370/94.2
<u>5613113</u>	March 1997	Goldring	395/618
<u>5737600</u>	April 1998	Geiner et al.	395/616
<u>5778387</u>	July 1998	Wilkerson et al.	707/202
<u>5784421</u>	July 1998	Dolev et al.	375/354
<u>5822381</u>	October 1998	Parry et al.	325/356

OTHER PUBLICATIONS

Lamport, Leslie, "Time, Clocks, and the Ordering of Events in a Distributed System," Operating Systems, Communications of the ACM, Jul. 1978, vol. 21, No. 7, pp. 558-565, ACM 0001-0782/78/0700-0558.

Li, Chung-Sheng and Ofek, Yoram, "Distributed Source-Destination Synchronization Using Inband Clock Distribution," IEEE Journal on Selected Areas in Communications, vol. 14, No. 1, Jan. 1996.

Sens, Pierre, "The Performance of Independent Checkpointing in Distributed Systems," Proceedings of the 28th Annual Hawaii International Conference on System Sciences--1995.

Abali, Bulent and Stunkel, Craig B., "Time Synchronization on SP1 and SP2 Parallel Systems," IBM Thomas J. Watson Research Center, N.Y., 1995.

Vervoort, W.A., teWest, R., Schoute, A.L. and Hofstede, J., "Distributed Time-Management in Transputer Networks," Department of Computer Science, University of Twente, The Netherlands, 1991.

Comer, Douglas E. and Yavatkar, Raji, "High-Speed Propagation of Link Status Routing Control Information," Department of Computer Science at Purdue University and the University of Kentucky, 1990.

ART-UNIT: 277

PRIMARY-EXAMINER: Kulik; Paul V.

ATTY-AGENT-FIRM: McDermott, Will & Emery

ABSTRACT:

Techniques for determining a safe recovery time value after a failure of a first node in a computer system are described. According to the techniques, every node in a multi-node parallel database system maintains a logical clock for generating timestamps. The logical clocks are synchronized by attaching a current timestamp to every message that is sent by a node. When a node receives an incoming timestamp that is greater than the value indicated by the associated logical clock, it sets the associated logical clock forward to at least the value of the timestamp. When a node fails, a recovery node calculates a "safe" logical clock value to use in recovering the crashed node. In calculating the "safe" logical clock value, the recovery node searches specific areas of the database to locate and recover a most recent timestamp value associated with the crashed node. The recovery node then compares its current logical clock time value with the most recent crash node timestamp value to determine which timestamp is most recent. If the most recent crash node timestamp value is more recent than the recovery node's current logical clock time value, the recovery node's logical clock is updated to be at least as recent as the most recent crash node timestamp value. The recovery node then recovers the crashed node as its logical clock is guaranteed to be at least as recent as any timestamp value that was previously written to the database by the crashed node prior to failure.

54 Claims, 8 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference		Claims	IMC	Draw Desc	Image
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Term	Documents
MULTI	1156348
MULTIS	140
NODE	323336
NODES	201918
(4 AND (MULTI NEAR NODE)) .PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD.	5
(L4 AND (MULTI NEAR NODE)) .PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD.	5

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**PALM INTRANET**Day : Thursday
Date: 1/19/2006
Time: 18:23:57**Application Number Information**Application Number: 10/965360 [Assignments](#)

Filing or 371(c) Date: 10/12/2004

Effective Date: 10/12/2004

Application Received: 10/14/2004

Pat. Num./Pub. Num: /20050065907

Issue Date: 00/00/0000

Date of Abandonment: 00/00/0000

Attorney Docket Number: 50277-2658

Status: 120 /NOTICE OF APPEAL FILED

Confirmation Number: 4408

Title of Invention: MANAGING CHECKPOINT QUEUES IN A MULTIPLE NODE SYSTEM

Examiner Number: 73675 / [CORRIELUS, JEAN](#)

Group Art Unit: 2162

Class/Subclass: 707/205.000

Lost Case: NO

Interference Number:

Unmatched Petition: NO

[L&R Code](#): Secrecy Code:1

Third Level Review: NO

Oral Hearing: NO

IFW IMAGE

Waiting for Response Desc.

[AP.C](#)[Not of Appeal FI](#)[Prior Art Filed](#)

Secrecy Order: NO

Status Date: 12/29/2005

Bar Code	PALM Location	Location Date	Charge to Loc	Charge to Name	Employee Name	Location
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Appln Info	Contents	Petition Info	Atty/Agent Info	Continuity Data	Foreign Data	Inventors	Address
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